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experimental study has been performed to assess the effect of work-piece preheating using induction heating in enhancing machinability of AISI H13. The preheated machining of AISI H13 under different cutting conditions conducted with TiAlN coated carbide tool is evaluated in terms of tool wear, surface roughness and vibration. The results illustrated the advantages of preheated machining by a much extended tool life, better surface finish and stable cutting with much lower vibration/chatter amplitudes. The effects of preheating temperature on the chip morphology were also investigated and it is found that preheating resulted in the formation of relatively stable chips and reduction of chip serration frequency.

P-129 Enhancement of Machinability of Nickel Based Alloy - Inconel 718 by Induction Preheating in End Milling using Ceramic Inserts

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Unique combinations of high strength properties maintained at elevated temperature and high resistance to chemical degradation have made Nickel based alloy, Inconel 718 suitable for application as aerospace components. However, the same properties are responsible for very poor machinability of the material, as Inconel is one of the most difficult to cut materials. The main reason for poor machinability is generation of high heat during machining which lead to premature failure of the tool due to plastic deformation and diffusion. Uncoated and coated tools have been found to be not efficient in cutting this materials and the application of preheated resulted in not significant improvement in their machinability. PCD tools are not recommended for machining this material since it contains iron which acts as a catalyst to convert diamond into graphite at temperatures in excess of 700 °C. PCBN tools are very costly and also did not show very good performance in machining Inconel 718. Ceramic tools have proved to have performed well in machining the material. However, there was so far no work performed performance of ceramic tools in machining Inconel 718 using preheated technique. Since ceramic tools can perform under high temperatures, it was expected that preheated machining using ceramic tools would desired results. In this research work induction heating technique in combination of the application of ceramic tools was adopted as one of the machining techniques in order to improve the machinability of the material. The effect of preheated machining of Inconel 718 has been analyzed in terms of tool wear, surface roughness and chip formation. The advantages of preheated machining are demonstrated by appreciable increase in tool life, better surface roughness values and improved chip formation compared to room temperature machining.

P-130 Development of a Cost Effective Technique to Eliminate Conventional Finishing Operations Applying High Speed End Milling of Silicon

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Silicon has been widely used in different branches of industrial engineering. Most application of silicon is in computer parts or hardware especially for the production of integrated circuit (IC) chips. Machining of silicon is a big challenge and expensive affair because of its inherent brittleness which is a major limitation as the process of removing the material can generate subsurface damage. Silicon is conventionally finished using grinding followed by polishing and lapping to achieve required surface finish and surface integrity. Numerous research works attempted to conduct ductile mode grinding to avoid cracking and subsurface damages. However, it has been revealed that sub surface damages and micro cracks can be avoided if grinding is performed. As a result, lengthy etching operations need to be performed to remove the surface defect created by grinding. Hence, it is extremely important to develop alternative techniques to improve surface finish and avoid/minimize subsurface damages in order to lower the cycle time in machining and finishing of silicon chips. An attempt has been made in this work to investigate the effect of high speed end milling on surface finish and integrity of silicon to minimizing the amount of finishing requirement in machining of silicon, with the objective of reducing cost and